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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,603	03/23/2001	Mark Lynn Jenson	1327.009US1	6175

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LEMAIRE PATENT LAW FIRM, P.L.L.C.
PO BOX 11358
ST PAUL, MN 55111

EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 09/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/816,603	JENSON, MARK LYNN	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 August 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11,13-33 and 36-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11,13-33 and 36-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03/08/04* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/12/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This action is in response to the amendment filed on 08/12/05. The applicant has overcome the 35 USC 103 rejection. Refer to the abovementioned amendment for substance of applicant's rebuttal arguments. However, the claims are again rejected over newly discovered art as set forth hereinbelow. Thus, the present application is now finally rejected for the reasons of record.

Clarifying note: *This application remains active because applicant filed a request for continued examination under 37 CFR 1.114 on 02/24/04 after the notice of allowance of 02/12/04.*

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 08/12/05 was considered by the examiner.

Drawings

2. The formal drawings were received on 03/08/04. These drawings are acceptable.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 11, 13-15, 18-24, 31, 33, 39-40 and 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al 5411592 in view of Mitlitsky et al 5714404.

The instant application is directed to system for making a thin-film device wherein the claimed inventive concept comprises the specific deposition means (station) that deposits the layers.

<u>With respect to claims 11, 21, 22 and 31:</u>

Ovshinsky et al disclose an apparatus for deposition of thin-film solid state batteries (title) comprising a multi-chambered deposition apparatus for depositing battery materials onto substrate material (abstract/col 6, lines 25-43). The apparatus includes at least three distinct evacuable deposition chambers, interconnected in series; the first deposition chamber is adapted to deposit a layer of battery electrode material onto the substrate (abstract/col 6, lines 25-43). The second deposition chamber is adapted to deposit a layer of electrolyte material onto the layer of the battery electrode material deposited in the first chamber. The third deposition chamber is adapted to deposit another layer of battery electrode material onto the electrolyte layer (abstract/ col 6, lines 25-43). Initially, the substrate passes to the first deposition chamber then it is transported to the second chamber, next the substrate is passed through another gas gate into the third deposition chamber (col 11, lines 58 to col 12, line 7). *Thus, the process is continuous.*

Each electrochemical cell includes a thin-film negative electrode layer, a thin-film positive electrode layer and a thin-film electrolyte layer (col 9, lines 25-28). The chambers are specifically adapted to deposit battery materials onto the substrate (col 11, lines 50-58). *The*

energy conversion device is the battery itself which is being deposited over the substrate in the form of different layers.

The deposition chambers are preferably adapted to deposit materials by at least one method selected from the group consisting of chemical vapor deposition, microwave plasma enhanced chemical vapor deposition, sputtering, laser ablation among them (col 7, lines 65 to col 8, line 3).

As to claim 13:

It is disclosed that a product variation is the deposition of the thin-film batteries onto substrates on the opposite side of thin-film silicon solar cells (photovoltaic cells) to integrate the collection and storage of solar energy (col 11, lines 39-43). *It is noted that a solar cells is also known in the art as a photovoltaic cell; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Ovshinsky et al at once envisage the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

As to claim 14:

It is disclosed that the chambers are physically interconnected in series (col 6, lines 29-31) and the deposition chambers are interconnected by gas gates such that the substrate material is allowed to proceed from one deposition chamber to the next, while maintaining gaseous segregation between the chambers (col 6, lines 40-44).

In reference to claim 15:

It is taught that a third embodiment comprises an evacuable payout chamber which is physically connected in series to the first deposition chamber; the payout chamber holds a roll of

substrate material (flexible material as it has been rolled) which is unrolled and passed to the first deposition chamber (col 6, line 65 to col 7, line 2).

On the matter of claims 18-19, 23 and 39:

Ovshinsky et al disclose that the substrate may be formed from an electrically conductive metal (rigid material) or from an electrically insulating polymer (col 9, lines 3-6). *Thus, the rolled substrate material is understood to be a continuous plastic sheet.* The use of an elongated web of substrate material is disclosed (col 13, lines 13-17).

With respect to claims 24 and 40:

It is disclosed that a second embodiment comprises a deposition apparatus for depositing single or multi-celled batteries upon precut substrates (wafers), that is a substrate which is of relatively limited length and width dimensions when compared to rolls of substrate web which can be as long as 2000 ft or more (col 12, lines 35-46).

As far as claim 32 (see also rejection below):

Ovshinsky et al disclose that for lithium ion system, the positive electrode layer can be formed from a material such as metal oxides and lithiated metal oxides compound such as $LiCoO_4$ (col 10, lines 30-34).

Regarding claim 33:

It is disclosed that a second embodiment comprises an apparatus including an substrate insertion chamber which is physically interconnected in series to the first deposition chamber; the insertion chamber is adapted to hold one or more individual substrates and pass them to the first deposition chamber (col 6, lines 44-64).

Ovshinsky et al disclose an apparatus for deposition of thin-film batteries according to the foregoing. However, Ovshinsky et al do not expressly disclose the specific ion-assist energy technique.

As to claims 11, 20, 21, 22 and 43:

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of solar cells (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a photovoltaic cell; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al at once envisage the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of Ovshinsky et al to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while maintaining or improving efficiency; and using either low temperature or high temperature

substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

5. Claims 11, 13-33 and 36-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shul et al 6432577 in view of Mitlitsky et al 5714404.

Shul et al disclose an apparatus and method for fabricating a microbattery (TITLE) wherein the microbattery comprises a dielectric membrane; a first electrode containing anodic material mounted on one side of the membrane (CLAIMS 1, 6 and 11); a second electrode containing cathodic material mounted on the opposite side of the membrane; a first silicon frame mounted with the first electrode and on the side opposite the porous membrane; a second silicon frame mounted with the second electrode and on the side opposite the porous membrane (CLAIMS 1, 6 and 11).

Shul et al further disclose the inclusion of a photovoltaic cell C and a power management circuitry P (COL 3, lines 29-35/ COL 2, lines 48-52). As apparent from **Figure 1** below, the photovoltaic cell C is deposited on the battery (See FIGURE 1). Shul et al also disclose the a deep reactive ion etch process for treating the battery components (COL 2, lines 24-30 & lines 52-57/ COL 4, lines 32-40 & lines 46-55).

Given that Shul et al disclose the apparatus for fabricating the microbattery and the layered battery structure, thus, the specific substrate supply station(s) and deposition station(s)/means are inherently disclosed.

Figure 1 below illustrates the specific layered battery:

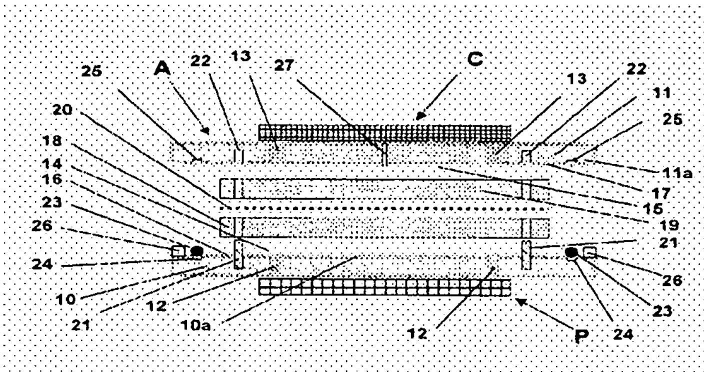

Figure 1

SUMMARY OF THE INVENTION

In one embodiment, a set of four Si wafers is used to form the planar microbattery structure. The two exterior Si wafers or frames are used to enclose and seal the anode and cathode of the microbattery while providing support for external circuitry. For example, on one Si frame, power management circuitry that is either pre-fabricated on the wafer, or attached as a hybrid, can be precisely located. The other exterior Si frame can be used to support photovoltaic cells that can be used as a power source for the microbattery. Through-frame plated vias can also be fabricated into the Si frame structures to provide electrical contact from the external circuitry to the anode and cathode. The interior Si wafers are patterned using DRIE in a honeycomb cell structure for placement of the anodic and cathodic battery materials. A patterned insulating layer overlaid by an electronic conductor can be placed onto the Si frames as one option for current collection. A dielectric porous membrane is located between the anode and cathode layers to prevent contact of the solid battery materials but allow the flow of the electrolyte material between electrodes as well as possibly providing continuous mechanical support throughout the structure. The silicon frames and interior electrodes are accurately aligned using alignment wells and pins. Bonding of the silicon frames can be used to form a hermetically sealed structure.

Shul et al disclose an apparatus for fabricating a microbattery as described above. Nevertheless, Shul et al does not expressly disclose the specific ion-assist energy technique.

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while

maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of solar cells (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a photovoltaic cell; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al at once envisage the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of Shul et al to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while maintaining or improving efficiency; and using either low temperature or high temperature substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

6. Claims 11, 20-22 and 43 rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese document JP 62-044960 in view of Mitlitsky et al 5714404.

The JP'960 document discloses a thin film secondary battery manufacturing equipment by employing a cluster ion beam deposition unit comprising cluster gun section, plural cluster guns, plural crucibles and plural nozzles to prepare positive electrode, electrolyte and negative electrode material (PURPOSE) wherein the equipment comprises a verger, cluster gun sections to form a crystallized thin film of a disulfide material on the substrate section; and thereafter,

crystallized thin film electrolyte is formed thereon and a cluster gun section is used to form Li thin film on the substrate (CONSTITUTION).

The JP'960 document discloses a thin film manufacturing equipment according to the foregoing. However, the JP'960 does not expressly disclose the specific ion-assist energy technique.

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of <u>solar cells</u> (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a <u>photovoltaic cell</u>; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al <u>at once envisage</u> the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of the JP'960 publication to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while

maintaining or improving efficiency; and using either low temperature or high temperature substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

7. Claims 11, 13-15, 18-24, 31, 33, 39-40 and 42-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al 5411592 in view of Muffoletto et al 6599580 and further in view of Mitlitsky et al 5714404.

The instant application is directed to system for making a thin-film device wherein the claimed inventive concept comprises the specific deposition means (station) that deposits the layers.

With respect to claims 11, 21, 22 and 31:

Ovshinsky et al disclose an apparatus for deposition of thin-film solid state batteries (title) comprising a multi-chambered deposition apparatus for depositing battery materials onto substrate material (abstract/col 6, lines 25-43). The apparatus includes at least three distinct evacuable deposition chambers, interconnected in series; the first deposition chamber is adapted to deposit a layer of battery electrode material onto the substrate (abstract/col 6, lines 25-43). The second deposition chamber is adapted to deposit a layer of electrolyte material onto the layer of the battery electrode material deposited in the first chamber. The third deposition chamber is adapted to deposit another layer of battery electrode material onto the electrolyte layer (abstract/ col 6, lines 25-43). Initially, the substrate passes to the first deposition chamber then it is

transported to the second chamber, next the substrate is passed through another gas gate into the third deposition chamber (col 11, lines 58 to col 12, line 7). *Thus, the process is continuous.*

Each electrochemical cell includes a thin-film negative electrode layer, a thin-film positive electrode layer and a thin-film electrolyte layer (col 9, lines 25-28). The chambers are specifically adapted to deposit battery materials onto the substrate (col 11, lines 50-58). *The energy conversion device is the battery itself which is being deposited over the substrate in the form of different layers.*

The deposition chambers are preferably adapted to deposit materials by at least one method selected from the group consisting of chemical vapor deposition, microwave plasma enhanced chemical vapor deposition, sputtering, laser ablation among them (col 7, lines 65 to col 8, line 3). *It is noted that sputtering and laser ablation are ion-assist energy deposition techniques.*

<u>As to claim 13:</u>

It is disclosed that a product variation is the deposition of the thin-film batteries onto substrates on the opposite side of thin-film silicon solar cells (photovoltaic cells) to integrate the collection and storage of solar energy (col 11, lines 39-43).

<u>As to claim 14:</u>

It is disclosed that the chambers are physically interconnected in series (col 6, lines 29-31) and the deposition chambers are interconnected by gas gates such that the substrate material is allowed to proceed from one deposition chamber to the next, while maintaining gaseous segregation between the chambers (col 6, lines 40-44).

<u>In reference to claim 15:</u>

It is taught that a third embodiment comprises an evacuable payout chamber which is physically connected in series to the first deposition chamber; the payout chamber holds a roll of substrate material (flexible material as it has been rolled) which is unrolled and passed to the first deposition chamber (col 6, line 65 to col 7, line 2).

On the matter of claims 18-19, 23 and 39:

Ovshinsky et al disclose that the substrate may be formed from an electrically conductive metal (rigid material) or from an electrically insulating polymer (col 9, lines 3-6). *Thus, the rolled substrate material is understood to be a continuous plastic sheet.* The use of an elongated web of substrate material is disclosed (col 13, lines 13-17).

With respect to claims 24 and 40:

It is disclosed that a second embodiment comprises a deposition apparatus for depositing single or multi-celled batteries upon precut substrates (wafers), that is a substrate which is of relatively limited length and width dimensions when compared to rolls of substrate web which can be as long as 2000 ft or more (col 12, lines 35-46).

As far as claim 32 (see also rejection below):

Ovshinsky et al disclose that for lithium ion system, the positive electrode layer can be formed from a material such as metal oxides and lithiated metal oxides compound such as $LiCoO_4$ (col 10, lines 30-34).

Regarding claim 33:

It is disclosed that a second embodiment comprises an apparatus including an substrate insertion chamber which is physically interconnected in series to the first deposition chamber;

the insertion chamber is adapted to hold one or more individual substrates and pass them to the first deposition chamber (col 6, lines 44-64).

Ovshinsky et al disclose an apparatus for deposition of thin-film batteries according to the foregoing. However, Ovshinsky et al do not expressly disclose the specific ion-assist energy technique.

As to claims 11, 20, 21, 22 and 43:

Muffoletto et al disclose a method for improving electrical conductivity of a metal oxide layer on a substrate utilizing energy beam mixing (TITLE). Muffoletto et al further disclose that the step of depositing can be carried out by ion beam assisted deposition (ABSTRACT); wherein the high energy beam can be an ion beam from a high energy ion source (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to employ the specific ion-assist energy technique of Muffoletto et al in the apparatus of Ovshinsky et al to fabricate thin-film batteries as Muffoletto et al disclose that such specific technique improves electrical conductivity of a metal layer on a substrate; and may be used either on treated or untreated substrates and in the manufacture of electrodes for devices such as batteries.

Additionally, neither Ovshinsky et al nor Muffoletto et al expressly disclose the formation of crystallization.

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of

the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of solar cells (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a photovoltaic cell; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al at once envisage the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of Ovshinsky et al-Muffoletto et al to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while maintaining or improving efficiency; and using either low temperature or high temperature substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

8. Claims 11, 13-33 and 36-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shul et al 6432577 in view of Muffoletto et al 6599580 and further in view of Mitlitsky et al 5714404.

Shul et al disclose an apparatus and method for fabricating a microbattery (TITLE) wherein the microbattery comprises a dielectric membrane; a first electrode containing anodic material mounted on one side of the membrane (CLAIMS 1, 6 and 11); a second electrode containing cathodic material mounted on the opposite side of the membrane; a first silicon frame mounted with the first electrode and on the side opposite the porous membrane; a second silicon frame mounted with the second electrode and on the side opposite the porous membrane (CLAIMS 1, 6 and 11).

Shul et al further disclose the inclusion of a photovoltaic cell C and a power management circuitry P (COL 3, lines 29-35/ COL 2, lines 48-52). As apparent from **Figure 1** below, the photovoltaic cell C is deposited on the battery (See FIGURE 1). Shul et al also disclose the a deep reactive ion etch process for treating the battery components (COL 2, lines 24-30 & lines 52-57/ COL 4, lines 32-40 & lines 46-55).

Given that Shul et al disclose the apparatus for fabricating the microbattery and the layered battery structure, thus, the specific substrate supply station(s) and deposition station(s)/means are inherently disclosed.

Figure 1 below illustrates the specific layered battery:

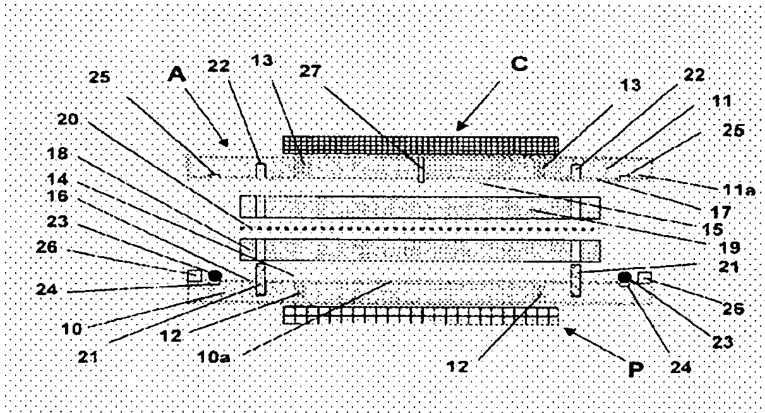

Figure 1

SUMMARY OF THE INVENTION

In one embodiment, a set of four Si wafers is used to form the planar microbattery structure. The two exterior Si wafers or frames are used to enclose and seal the anode and cathode of the microbattery while providing support for external circuitry. For example, on one Si frame, power management circuitry that is either pre-fabricated on the wafer, or attached as a hybrid, can be precisely located. The other exterior Si frame can be used to support photovoltaic cells that can be used as a power source for the microbattery. Through-frame plated vias can also be fabricated into the Si frame structures to provide electrical contact from the external circuitry to the anode and cathode. The interior Si wafers are patterned using DRIE in a honeycomb cell structure for placement of the anodic and cathodic battery materials. A patterned insulating layer overlaid by an electronic conductor can be placed onto the Si frames as one option for current collection. A dielectric porous membrane is located between the anode and cathode layers to prevent contact of the solid battery materials but allow the flow of the electrolyte material between electrodes as well as possibly providing continuous mechanical support throughout the structure. The silicon frames and interior electrodes are accurately aligned using alignment wells and pins. Bonding of the silicon frames can be used to form a hermetically sealed structure.

Shul et al disclose an apparatus for fabricating a microbattery as described above. Nevertheless, Shul et al does not expressly disclose the specific ion-assist energy technique.

Muffoletto et al disclose a method for improving electrical conductivity of a metal oxide layer on a substrate utilizing energy beam mixing (TITLE). Muffoletto et al further disclose that the step of depositing can be carried out by ion beam assisted deposition (ABSTRACT); wherein the high energy beam can be an ion beam from a high energy ion source (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to employ the specific ion-assist energy technique of Muffoletto et al in the apparatus of Shul et al to fabricate the microbattery as Muffoletto et al disclose that such specific technique improves electrical conductivity of a metal layer on a substrate; and may be used either on treated or untreated substrates and in the manufacture of electrodes for devices such as batteries.

Additionally, neither Shul et al nor Muffoletto et al expressly disclose the formation of crystallization.

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of solar cells (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a photovoltaic cell; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al at once envisage the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of Shul et al-Muffoletto et al to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while maintaining or improving efficiency; and using either low temperature or high temperature substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

9. Claims 11, 20-22 and 43 rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese document JP 62-044960 in view of Muffoletto et al 6599580 and <u>further in view of Mitlitsky et al 5714404</u>.

The JP'960 document discloses a thin film secondary battery manufacturing equipment by employing a cluster ion beam deposition unit comprising cluster gun section, plural cluster guns, plural crucibles and plural nozzles to prepare positive electrode, electrolyte and negative electrode material (PURPOSE) wherein the equipment comprises a verger, cluster gun sections to form a crystallized thin film of a disulfide material on the substrate section; and thereafter, crystallized thin film electrolyte is formed thereon and a cluster gun section is used to form Li thin film on the substrate (CONSTITUTION).

The JP'960 document discloses a thin film manufacturing equipment according to the foregoing. However, the JP'960 does not expressly disclose the specific ion-assist energy technique.

Muffoletto et al disclose a method for improving electrical conductivity of a metal oxide layer on a substrate utilizing energy beam mixing (TITLE). Muffoletto et al further disclose that the step of depositing can be carried out by ion beam assisted deposition (ABSTRACT); wherein the high energy beam can be an ion beam from a high energy ion source (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to employ the specific ion-assist energy technique of Muffoletto et al in the apparatus of the JP'960 publication to fabricate thin-film equipment as Muffoletto et al disclose that such specific technique improves electrical conductivity of a metal layer on a substrate; and may be used either on treated or untreated substrates and in the manufacture of electrodes for devices such as batteries.

<u>Additionally, neither the JP'960 publication nor Muffoletto et al expressly disclose the formation of crystallization.</u>

Mitlitsky et al disclose the fabrication of polycrystalline thin films by pulsed laser processing (TITLE). Particularly, a method for fabricating polycrystalline thin films on low temperature substrates which uses processing temperatures that are low enough to avoid damage to the substrate (ABSTRACT/COL 2, lines 41-67), and then transiently heating select layers of the thin films with at least one pulse of a laser or other homogenized beam source (ABSTRACT/ COL 2, lines 41-67). The pulse length is selected so that the layers of interest are transiently heated to a temperature which allows recrystallization and/or dopant activation while maintaining the substrate at a temperature which is sufficiently low to avoid damage to the substrate; this method is particularly applicable in the fabrication of <u>solar cells</u> (ABSTRACT/ COL 2, lines 41-67). *It is noted that a solar cells is also known in the art as a <u>photovoltaic cell;</u>*

solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action. Thus, Mitlitsky et al <u>*at once envisage*</u> *the formation of photovoltaic cells (solar cells), thereby the inclusion of processing means (i.e. deposition station) therefor.*

In view of the above, it would have been obvious to a skilled artisan at the time the invention was made to use the specific ion-assist energy technique of Mitlitsky et al in the in the apparatus of the JP'960 publication-Muffoletto et al to fabricate thin-film batteries as Mitlitsky et al reveals that their specific technique reduce the cost and weight of the substrates used in cell fabrication while maintaining or improving efficiency; and using either low temperature or high temperature substrate. Accordingly, the deposition steps of Mitlitsky et al are performed at temperatures which are sufficiently low to avoid damage to the substrate, and increasing the grain or crystal size of the deposited material.

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combinations of: a) Ovshinsky et al 5411592 in view of Mitlitsky et al 5714404; and/or b) Shul et al 6432577 in view of Mitlitsky et al 5714404; and/or c) the Japanese document JP 62-044960 in view of Mitlitsky et al 5714404; and/or d) Ovshinsky et al 5411592 in view of Muffoletto et al 6599580 and further in view of Mitlitsky et al 5714404; and/or e) Shul et al 6432577 in view of Muffoletto et al 6599580 and further in view of Mitlitsky et al 5714404; and/or f) the Japanese document JP 62-044960 in view of Muffoletto et al 6599580 and further in view of Mitlitsky et al 5714404 as applied to claim 11 above, and further in view of Matsui et al 5558953.

Ovshinsky et al-Mitlitsky et al, Shul et al-Mitlitsky et al and/or the JP'960 document-Mitlitsky et al, Ovshinsky et al-Muffoletto et al-Mitlitsky et al, Shul et al-Muffoletto et al-

Mitlitsky et al and/or the JP'960 document-Muffoletto et al-Mitlitsky et al are applied, argued and incorporated herein for the reasons above. In addition, the preceding references do not disclose the specific material $LiCoO_2$.

Matsui et al disclose that as a positive electrode (cathode) of the lithium battery, it is preferable to use an active material such as $LiCoO_2$ (col 4, lines 48-57).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific material $LiCoO_2$ to form the second layer of the layer-deposited battery of either Ovshinsky et al-Mitlitsky et al, and/or Shul et al-Mitlitsky et al and/or the JP'960 document- Mitlitsky et al, and/or Ovshinsky et al-Muffoletto et al-Mitlitsky et al, and/or Shul et al-Muffoletto et al- Mitlitsky et al and/or the JP'960 document-Muffoletto et al-Mitlitsky et al as Matsui et al disclose that it is preferable to use $LiCoO_2$ as an active material because such a compound is capable of imparting a discharge voltage of 4V level.

Response to Arguments

11. Applicant's arguments with respect to claims 11, 13-33 and 36-45 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2005/0199282 (*see paragraph 0036*) is herein cited to show that solar cells are also known in the art as a photovoltaic cells; solar cell absorbs sunlight or collect solar energy and converts it to electricity through photovoltaic action.

13. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on 08/12/05 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Primary Examiner
Art Unit 1745

RAYMOND ALEJANDRO
PRIMARY EXAMINER